TOOTHBRUSH

FIELD OF THE INVENTION

[0001] The present invention relates in general to toothbrushes and more particularly to toothbrushes having structure to aid in cleaning the teeth along the gum line.

BACKGROUND OF THE INVENTION

[0002] Plaque is a serious problem in dental care and plaque build-ups must be cleaned and removed regularly to reduce the risk of tooth decay and gum disease. It is important to regularly remove sub-gingival plaque build-up as this plaque, along with organic material builds up with the plaque, causes gum disease known as gingivitis. Because plaque hardens relatively quickly, it is important to remove any sub-gingival plaque at least each day.

[0003] Conventional toothbrushes are generally used in every day dental care and some plaque on the teeth is removed by brushing with these conventional toothbrushes. While brushing using conventional toothbrushes aids in removing some plaque that is newly formed on the teeth, such toothbrushes do not adequately remove sub-gingival plaque (plaque along the gum line). Thus, even with regular brushing, plaque can build up at the sulcus around each tooth, leading to gum disease.

[0004] Many variations to the conventional toothbrush have been proposed and are available for aiding in cleaning teeth. For example, different lengths of bristle tufts and different toothbrush head geometries are available on the market. While many of these toothbrushes are helpful in cleaning in between teeth and cleaning the back of the teeth, for example, these toothbrushes do not significantly aid in the removal of sub-gingival plaque.

[0005] Dental floss is generally used to help remove newly formed sub-gingival plaque. It is well known, however, that a very low percentage of adults floss their teeth daily and thus, the sub-gingival plaque is not regularly removed.

[0006] Accordingly, it is desirable to provide a toothbrush having structure to aid in cleaning the teeth along the gum line and removing sub-gingival plaque.

SUMMARY OF THE INVENTION

[0007] According to still another aspect of the present invention, a toothbrush includes a handle for grasping during use and a head connected to an end of the handle. The head has a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and ends of the tufts are tapered inwardly.

[0008] According to another aspect of the present invention, a replaceable toothbrush head includes first and second ends and a front and a back. The head further includes a coupling at the first end for removably connecting to a handle and a plurality of tufts of bristles extending from the front, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and ends of the tufts are tapered inwardly.

[0009] According to one aspect of the present invention, a toothbrush includes a handle for grasping during use and a head connected to an end of the handle. The head has a plurality of tufts of bristles extending from a front thereof, from positions on either side of a longitudinal centerline of the front. The tufts are angled inwardly toward the centerline and the end of each tuft is tapered inwardly to an edge such that the edges of the tufts together combine to form a single brush edge.

[0010] Advantageously, the head of the toothbrush is configured such that the bristles can be placed at a side of a tooth during use and lightly directed into the sulcus to remove newly formed sub-gingival plaque. In one aspect, a copolyester sheath is provided for holding bristles together for sturdy, directed brush stroke and effective plaque removal. In another aspect, a stress breaker is used between the head of the toothbrush includes a flexible joint between the head and the handle or in the handle to reduce the risk of damaging the gingival tissue due to excessive force used during brushing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will be better understood with reference to the drawings and to the following description, in which:

[0012] Figure 1 is a perspective view of a toothbrush according to an embodiment of the present invention;

[0013] Figure 2 is an alternative perspective view of a portion of the toothbrush of Figure 1, drawn to a larger scale;

[0014] Figure 3 is a top view of the portion of the toothbrush of Figure 2;

[0015] Figure 4 is an end view of the toothbrush of Figure 1;

[0016] Figure 5 is an end view of the toothbrush of Figure 4 during use;

[0017] Figure 6 is a perspective view of a replaceable head of an electric toothbrush, according to another embodiment of the present invention;

[0018] Figure 7 is a perspective view of an electric toothbrush according to another embodiment of the present invention;

[0019] Figure 8 is an end view of a toothbrush according to another embodiment of the present invention.

[0020] Figure 9 is a perspective view of tufts of bristles of the toothbrush of Figure 8;

[0021] Figure 10 is a perspective view of a portion of a toothbrush according to another embodiment of the present invention;

[0022] Figure 11 is an end view of the toothbrush of Figure 10;

[0023] Figure 12 is a perspective view of a toothbrush according to another embodiment of the present invention; and

[0024] Figure 13 is a side view of the toothbrush of Figure 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Reference is first made to the Figure 1 to describe a toothbrush according to an embodiment of the present invention, the toothbrush 20 being indicated generally by the numeral 20. The toothbrush 20 includes a handle 22 for grasping during use and a head 24 connected to an end of the handle. The head 24 has a plurality of tufts 26 of bristles 28 extending from a front 30 thereof, from positions on either side of a longitudinal centerline 32 of the front 30. The tufts 26 are angled inwardly toward the centerline 32 and the end 34 of each tuft 26 is tapered.

[0026] The toothbrush 20 will now be described in more detail. As shown in the figures, the handle 22 of the toothbrush 20 extends longitudinally and is sized and shaped for grasping during use.

[0027] The head 24 and the handle 22 are connected together by an intermediary flexible joint 36. The flexible joint 36 aids in inhibiting the transfer of excessive force onto the

teeth or gingival tissue (gums) when excessive force is applied to the handle 22. The head 24, the handle 22 and the flexible joint 36 are integral. As shown, the head 24 extends longitudinally from the handle 22 and the flexible joint 36. In the present embodiment, the head 24, the handle 22 and the flexible joint 36 are unitary and are made of a molded plastic. It will be understood that the head 24 is appropriately sized and shaped for fitting into the mouth of a user during use.

[0028] The head 24 has a back 38 and the front 30. In the figures, the head 24 is shown having two halves 40, 42 divided by the longitudinal centerline 32. Clearly these halves 40, 42 are referred to herein for the purpose of clarity of explanation and, in fact, the halves 40, 42 are integral and unitary.

[0029] Each of the tufts 26 are made of approximately 40 bristles 28 surrounded by a sheath 39. In the present embodiment, the bristles 28 are nylon and are surrounded by the sheath 39, which is made of copolyester.

[0030] Referring now to Figures 2, 3, and 4, the plurality of tufts 26 of bristles 28 extend from the front of the head 24. In the present embodiment, three tufts 26 of bristles 28 extend from each of the two halves 40, 42. As shown, the three tufts 26 of bristles 28 on one half 40 are centered and equi-spaced along a longitudinally extending line 44 that is parallel with and spaced from the longitudinal centerline 32. Similarly, three tufts 26 of bristles 28 on the other half 42 are centered and equi-spaced along a second longitudinally extending line 46 that is parallel with and spaced from the longitudinal centerline 32.

[0031] The tufts 26 of bristles 28 are positioned such that the first tuft 26x (located closest to the handle 22) on the other half 42 extends from a longitudinal position between the longitudinal positions of the first and second tufts 26a, 26b, respectively, extending from the one-half 40. The second tuft 26y (middle tuft) on the other half 42, extends from a longitudinal position between the longitudinal positions of the second and third tufts 26b, 26c, respectively, extending from the one-half 40. Similarly, the second tuft 26b on the one-half 40 extends from a longitudinal position between a longitudinal positions of the first and second tufts 26x, 26y, respectively, extending from the other half 42. Also, the third tuft 26c on the one-half 40 extends from a longitudinal position between the longitudinal positions of the second and third tufts 26y, 26z, respectively, extending from the other half 42.

[0032] Each tuft 26 is angled inwardly toward the longitudinal centerline 32. Thus, the tufts 26a, 26b, 26c on the one-half 40, extend from the front 30 of the head 24 and at an angle to the front 30, toward the other half 42. Similarly, the tufts 26x, 26y, 26z on the other half 42, extend from the front 30 of the head 24 and at an angle to the front 30, towards the

one-half 40.

[0033] The end 34 of each of the tufts 26 is tapered to an edge 48 and the edges of all of the tufts 26 are aligned to form a single common brush edge. As shown, the tufts are angled and tapered as described above, to combined to form the single brush edge. Clearly, the taper on the tufts 26a, 26b, 26c, extending from the one-half 40 is opposite the taper on the tufts 26x, 26y, 26z, extending from the other half 42.

[0034] As shown in the figures, the single brush edge is generally laterally centered along the head 24 and lies in a plane that extends through the longitudinal centerline 32 and is generally perpendicular to the front 30. In this configuration, the single brush edge is made of tufts 26 of bristles 28 that extend from alternating halves 40, 42 of the head 24. Thus, the single brush edge is made of tufts 26 that extend in from alternating sides of the longitudinal centerline 32 such that each end of each tuft 26 is adjacent the end of a tuft from an opposite side of the longitudinal centerline 32. It can be seen that the single brush edge is made of tufts 26a, 26x, 26b, 26y, 26c, 26z, in that order.

[0035] In use, the handle of the toothbrush 20 is grasped by the user. Toothpaste is placed along the brush edge and the head 24 of the toothbrush 20 is inserted into the mouth of the user. Brushing is carried out by lightly pressing the tufts 26 against the teeth. The tapered ends 34 of the tufts 26 lay flat against the teeth and the toothbrush 20 is moved back and forth in a reciprocating motion so that the ends 34 of the tufts lightly brush inside the gingival sulcus to remove plaque is most likely to cause gingivitis, as best shown in Figure 5.

[0036] The flexible joint 36 between the head 34 and the handle 22 flexes to aid in inhibiting the transfer of excessive force on to the teeth or gingival tissue when excessive force is applied to the handle 22.

[0037] Reference is now made to the Figure 6 to describe a replaceable toothbrush head 24 in accordance with an embodiment of the present invention. As will be appreciated, the replaceable head 24 is for use with an electric toothbrush. The replaceable head includes a coupling portion 50 for connecting to the handle of the electric toothbrush. The coupling portion 50 includes a coupling art 52 and a connector 54 at an end of the coupling art for releasably connecting to a complementary and of the handle of the electric toothbrush. The connector 54 is a conventional connector 54 and therefore is not further described herein.

[0038] The remainder of the replaceable head 24 is similar to the head 24 of the toothbrush 20 of the first described embodiment. Thus, the head 24 includes the back 38

and the front 30. The plurality of tufts 26 of bristles 28 extend from the front of the head 24 and are tapered to form the brush edge. Similar to the first described embodiment, the brush edge is made of tufts 26 of bristles 28 that extend in from alternating sides of the head 24

[0039] Referring now to Figure 7, there is shown an electric toothbrush 20 according to another embodiment of the present invention. The electric toothbrush 20 includes a handle 22 connected to a head 24. In the present embodiment, the electric toothbrush 20 includes a switch 58 for operating to cause a platform 60 in the head 24 of the toothbrush to reciprocate. The electric toothbrush 20 of the present embodiment includes four tufts 26 of bristles 28 that extend from the platform 60 in the head 24, rather than 6 tufts extending from the head 24, as shown in the first described embodiment. The tufts 26 of the electric toothbrush 20, however, are arranged in a similar manner to the first-described embodiment. That is, the plurality of tufts 26 of bristles 28 are angled inwardly toward the centerline 32 and are tapered to an edge 48 that forms part of a brush edge. The brush edge is therefore made of tufts 26 of bristles 28 that extend in from alternating sides of the head 24.

[0040] Referring to Figures 8 and 9, which show an end view of a toothbrush 20 according to another embodiment of the present invention, and a perspective view of tufts 26 of bristles 28 of the toothbrush 20, respectively. In the present embodiment, the tufts 26 of bristles 28 are angled inwardly towards the centerline 32 and are tapered such that the bristles 28 that are farthest from the centerline 32 form the upper-most part of the edge 48. In the present embodiment, however, the edges 48 formed by each of the tufts 26 are not continuous to form a common brush edge as in the previous embodiments. Instead, the edges 48 are rounded as shown. As indicated, the bristle 28 that is farthest from the centerline 32 forms the upper-most part of each edge 48. The upper-most parts of the edges 48 (farthest from the front 30) are aligned and are centered above the head 24.

[0041] Reference is now made to Figure 10 and 11 to describe still another embodiment of the present invention. In the present embodiment, rather than the tufts 26 being tapered to an edge 48, each of the tufts 26 is tapered to a point 62. Similar to the edges of the first described embodiment, the points 62 are aligned and centered above the head 24.

[0042] Reference is now made to Figures 12 and 13 to describe a toothbrush 20 in accordance with still another embodiment of the present invention. The toothbrush 20 in the present embodiment includes a handle 22 and a head 24. In the present embodiment, however, the handle 22 includes an elbow 56 as shown. Instead of connecting to an end of the head 24, the end of the handle 22 connects to the back 38 of the head 24. The tufts 26

of bristles 28 are generally rectangular in cross-section. Similar to the first described embodiment, the tufts 26 are tapered to an edge 48 and extend from the front 30 of the head 24 at an angle toward the centerline 32 such that the edges 48 of the tufts 26 are aligned and are generally centered above the head 24. A common brush edge is formed by the edges 48 of the tufts 26 from alternating sides 40, 42 of the head.

[0043] This configuration is particularly useful in cleaning areas that are otherwise difficult to access. In particular, this toothbrush 20 is useful for cleaning, for example, bridge portions abutting natural teeth, distal surfaces of the back tooth of the upper and lower dentition and implants at the gingival and the sublingual areas.

[0044] Specific embodiments and variations of embodiments of the present invention have been shown and described herein. However, other variations and modifications to these embodiments may occur to those skilled in the art. For example, the head 24 is not limited to the number of tufts of bristles shown and described. Other suitable numbers of tufts are possible. Also, the size and shape of some of the heads can vary. For example, the size of the head can be made smaller for children.

[0045] Still other variations and modifications may occur to those skilled in the art. All such modifications and variations are believed to be within the sphere and scope of the present invention.